

NOV 27 1991

Assessment Highlights



Grade 3 Science Achievement Testing Program

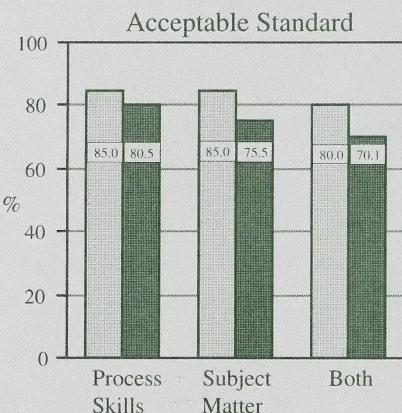
June 1991

ASSESSMENT HIGHLIGHTS

GRADE 3 SCIENCE ACHIEVEMENT TESTING PROGRAM

This report provides teachers, school administrators, and the public with a brief overview of the results for the June 1991 Grade 3 Science Achievement Test. It complements the detailed school and jurisdiction reports that were mailed to schools and school jurisdiction offices in mid-September. The 1991 *Provincial Report, Achievement Testing Program* provides complete analyses of the provincial results for the Grade 3 Science Achievement Test. This report will be available to educators and to the public in December 1991.

Percentage of Students Achieving:



Who Wrote the Test?

Students enrolled in the regular Grade 3 Science program were expected to write the 1991 Grade 3 Science Achievement Test. In 1991, 33 837 students wrote the test in English.

What Was the Test Like?

The test had 50 multiple-choice questions: 25 questions in Section 1 and 25 questions in Section 2. Students had 50 minutes to write the test. The test assessed students' process skills and their knowledge of subject matter.

How Well Did Students Do?

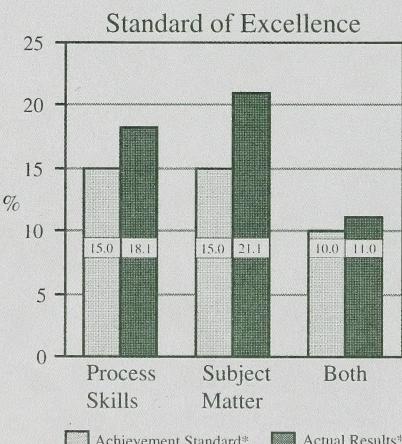
Not enough students demonstrated adequate skills and knowledge in Grade 3 Science. Too few met the acceptable standard in process skills or in subject matter. On the other hand, a larger number than expected achieved the standard of excellence. (See the graphs.)

Has Achievement Changed Since 1983?

A special study of changes in achievement was conducted in 1991 as part of the provincial assessment. The results showed that achievement levels in 1991 were higher than in 1983 and in 1987. Details are reported in the 1991 *Provincial Report, Achievement Testing Program*.

*the percentage of students in the province expected to meet the acceptable standard and the standard of excellence

**the percentage of students in the province who met the Achievement Standard



**Grade 3 Science
1991 Achievement Test Blueprint**

CURRICULUM COMPONENT	COMPONENT		TOTAL	COGNITIVE LEVEL		TOTAL
	Process Skills	Subject Matter		Knowledge	Application	
Matter and Energy	4, 5, 6, 7, 8, 29, 30, 31, 32	1, 2, 3, 26, 27, 28	15 [30%]	1, 26, 27	2, 3, 4, 5, 6, 7, 8, 28, 29, 30, 31, 32	15 [30%]
Living Things and Environment	12, 13, 14, 15, 35, 37, 38, 39, 40	9, 10, 11, 33, 34, 36	15 [30%]	9, 10, 33	11, 12, 13, 14, 15, 34, 35, 36, 37, 38, 39, 40	15 [30%]
Earth, Space, and Time	16, 42	17, 41	4 [8%]	17	16, 41, 42	4 [8%]
Process Skills Independent of Prescribed Subject Matter	18, 19, 20, 21, 22, 23, 24, 25, 43, 44, 45, 46, 47, 48, 49, 50		16 [32%]	18, 45, 46	19, 20, 21, 22, 23, 24, 25, 43, 44, 47, 48, 49, 50	16 [32%]
TOTAL	36 [72%]	14 [28%]	50 [100%]	10 [20%]	40 [80%]	50 [100%]

**Grade 3 Science
Results for Individual Multiple-Choice Questions**

Item	Key	Diff.*	Item	Key	Diff.	Item	Key	Diff.	Item	Key	Diff.
1	C	89.0	14	A	77.8	27	C	70.2	40	B	80.6
2	D	63.9	15	C	84.2	28	C	86.6	41	B	47.2
3	B	51.7	16	C	56.3	29	B	76.8	42	A	84.0
4	A	62.7	17	B	57.2	30	D	79.2	43	B	67.5
5	C	51.0	18	D	60.8	31	B	86.6	44	D	73.6
6	B	57.8	19	A	54.1	32	C	81.8	45	C	63.0
7	B	80.8	20	C	76.7	33	C	71.9	46	D	57.6
8	B	70.0	21	B	57.4	34	A	77.1	47	C	61.7
9	C	85.4	22	A	75.5	35	D	83.5	48	A	61.3
10	D	88.5	23	B	77.8	36	D	65.7	49	D	52.2
11	A	53.9	24	A	63.1	37	D	46.4	50	A	49.2
12	D	77.8	25	B	68.2	38	A	71.5			
13	D	76.1	26	C	31.1	39	A	77.5			

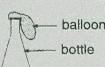
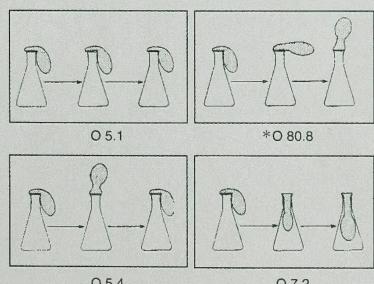
*Difficulty – percentage of students answering the question correctly

Observations

The following is a discussion of specific areas of strength and of difficulty for Grade 3 students. Sample questions have been provided to highlight the strengths and weaknesses of students achieving at the acceptable standard and at the standard of excellence. For each sample question, the correct answer is marked with an asterisk. The percentage of students choosing each alternative is also provided.

Acceptable Standard – Sample Questions and Commentary

7. If the bottle is heated, what will happen to the balloon?

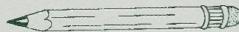
Test Blueprint

Each question on the test blueprint is classified in two ways: according to the curricular content area being assessed and according to the cognitive level demanded by the question. The test blueprint shows the distribution of questions according to these classifications. Numbers in [] brackets indicate actual emphasis in percentage.

Test Results

The table at the left shows question-by-question results and the keyed answers. There is a parallel table in the school and jurisdiction reports that teachers can use to determine the areas of strength and weakness of their students relative to the province as a whole.

19. Look at this picture.



An OBSERVATION that can be made about this pencil is that it has

54.1* a pointed end

19.7 just been sharpened

11.9 been used for writing

10.4 a pink eraser on the end

Observations (continued)

Acceptable Standard (continued)

40. Which group of plants and animals are found in an Alberta forest community?



28. To conserve energy, Jean could

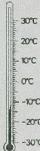
6.8 turn up the heat in his house

3.1 leave the refrigerator door open

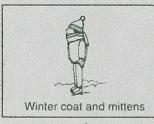
86.6* turn off all the lights when he goes to bed

2.2 leave the television on when he goes out to play

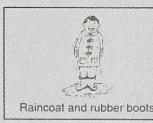
8. This is the temperature today.



What would be BEST to wear outside today?



O 11.0



O 3.9

O 14.2

What did students know and do well?

Generally, these students had an understanding of basic process skills. They could classify common animals based on similar physical characteristics; they could identify similarities presented in a graph or a chart. By observing, they could predict the next step in a sequence of events and could make simple interpretations.

Specifically, these students knew that when materials are heated, they occupy more space and can increase in size (question 7). As well, they knew that common objects made of specific materials may or may not have the ability to float on water or be attracted by a magnet. They also could identify some common plant and animal life of Alberta (question 40) and knew the importance of conserving energy in a home (question 28). Students knew that moss and mushrooms are types of plants that grow on decaying logs, and that birds, fish, and reptiles hatch from eggs. They understood the energy (food) chains that exist between plants and animals as well as the life cycle of a plant.

What did students have difficulty with?

These students had difficulty applying their science knowledge to new situations or to contexts that went beyond familiar plants and animals. Generally, they could not sort out extraneous information or apply their observation skills objectively.

For example in question 8, students achieving at the acceptable standard had difficulty making the necessary connections between temperature measurements and the conditions that exist in the environment. In question 19 (see the previous page), students were asked to make a direct observation about the pencil in the picture. Their responses indicated that they tended to rely on what they knew a pencil looked like rather than on what they could see in the picture.

Observations (continued)

Standard of Excellence – Sample Questions and Commentary

13. Tom predicted that radish seeds grow better in sand than in garden soil.

In each pot, he planted six radish seeds.

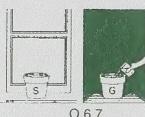


Sand

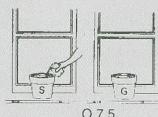


Garden soil

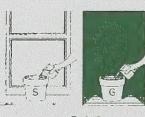
Which picture shows how Tom SHOULD test his prediction?



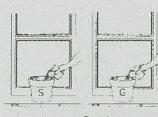
O 6.7



O 7.5



O 8.2



*O 76.1

25. Some trees in an area were cut down to make room for a baseball diamond.



What is the MOST likely result of this change?

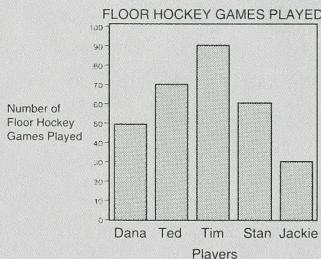
8.5 There are more shady places.

68.2 There are fewer birds in the area.

9.7 Children have less room to play.

6.4 More squirrels have built homes in the area.

24. Five students recorded the number of floor hockey games each of them played in one year.



Which student played 40 more games than Jackie?

63.1 Ted

5.6 Dana

20.5 Tim

5.3 Stan

What did students know and do well?

Students achieving at the standard of excellence exceeded all the standards achieved by students at the acceptable standard of performance. For example, they knew that a specific unit of measurement is necessary to make accurate measurements, that the senses of touch and sight can be used to estimate the length of an object, and they also knew which variables to control when experimenting with plant growth (question 13). These students also knew that metals expand when heated and that the phase changes of water can be reversed whereas the process of burning paper cannot. In addition, they understood the interrelationship that exists between living things and their environment (question 25) and how symbols can be used to represent changes of events that occur in nature.

These students had good observation and inference skills. They could read an outdoor thermometer, and they could order objects from lightest to heaviest based on their mass. These students could also classify unfamiliar living and nonliving things based on their observations of physical characteristics, apply general knowledge to solve novel problems, transfer new learnings gained from interpreting graphs (question 24), and analyse new situations.

What did students have difficulty with?

Analysis indicates that students achieving at the standard of excellence did not have any apparent difficulties with Grade 3 Science knowledge or process skills.

Teachers' Review of the Test

The Grade 3 Science teachers who reviewed the test felt that it was fair but tough. As well, they felt that the concepts and skills tested reflected the learning expectations of the Division I Science Program very well. Teachers also liked the use of questions that required students to think and apply their knowledge of science to the world they experience beyond the classroom.

Issues

Some Grade 3 teachers were concerned that students could not show us their best performance on an achievement test because of the reading level required to understand each question and its possible answers. However, the test questions in the June 1991 test were prepared by Grade 3 Science teachers and were written for students who are at the end of their Grade 3 year. Teachers who validated the test questions on field tests also said that the reading level was appropriate. Many teachers believe that learning the language of science occurs very well in language arts, social studies, and mathematics, or in activities outside the classroom and need not be restricted to a specific time slot each day. Still others believe a good way to teach science is to integrate it with language arts, social studies, and mathematics. Either way, students should have no difficulty reading the science achievement test and responding well to most of the questions.

In the future, as assessment is broadened to include portfolio and performance assessment, language will become even more important to learning science, whether science is heard or read, written or spoken.

Teachers also felt strongly that there were a high number of questions in the June 1991 Grade 3 Science test that in their opinions did not seem to tie into what they had taught during the school year. This may be a result of the following factors. First, the elementary science program is not grade specific but rather is broken into Division I for grades 1, 2, and 3, and Division II for grades 4, 5, and 6. Teachers must decide which subject matter and process skills should be taught in each of the three years. If this decision is followed through, students will have learned the necessary knowledge and skills. Secondly, it is not good enough for students to think about or do science only within the classroom context. Many questions required students to apply what they know or can do to situations beyond the classroom. Again, if students have not had the opportunity to think about science and relate it to their everyday life, then they will have difficulty with real-life situations.

Concluding Comments

Students' performance at the standard of excellence was remarkable. These students knew Division I Science. They understood the subject matter and were able to apply the concepts and skills to new or real-life situations.

Students performing at the acceptable standard, however, knew only basic concepts in science and were unable to perform many of the process skills inherent to science. Perhaps this inadequate performance is a result of poor program articulation or of the low priority that science is given in elementary grades. Whatever the reason, these students must have an opportunity to experience all parts of the program and to think about science and its applications beyond the classroom.

For further information contact Greg Hall, Science Test Development Specialist, at 427-0010.

